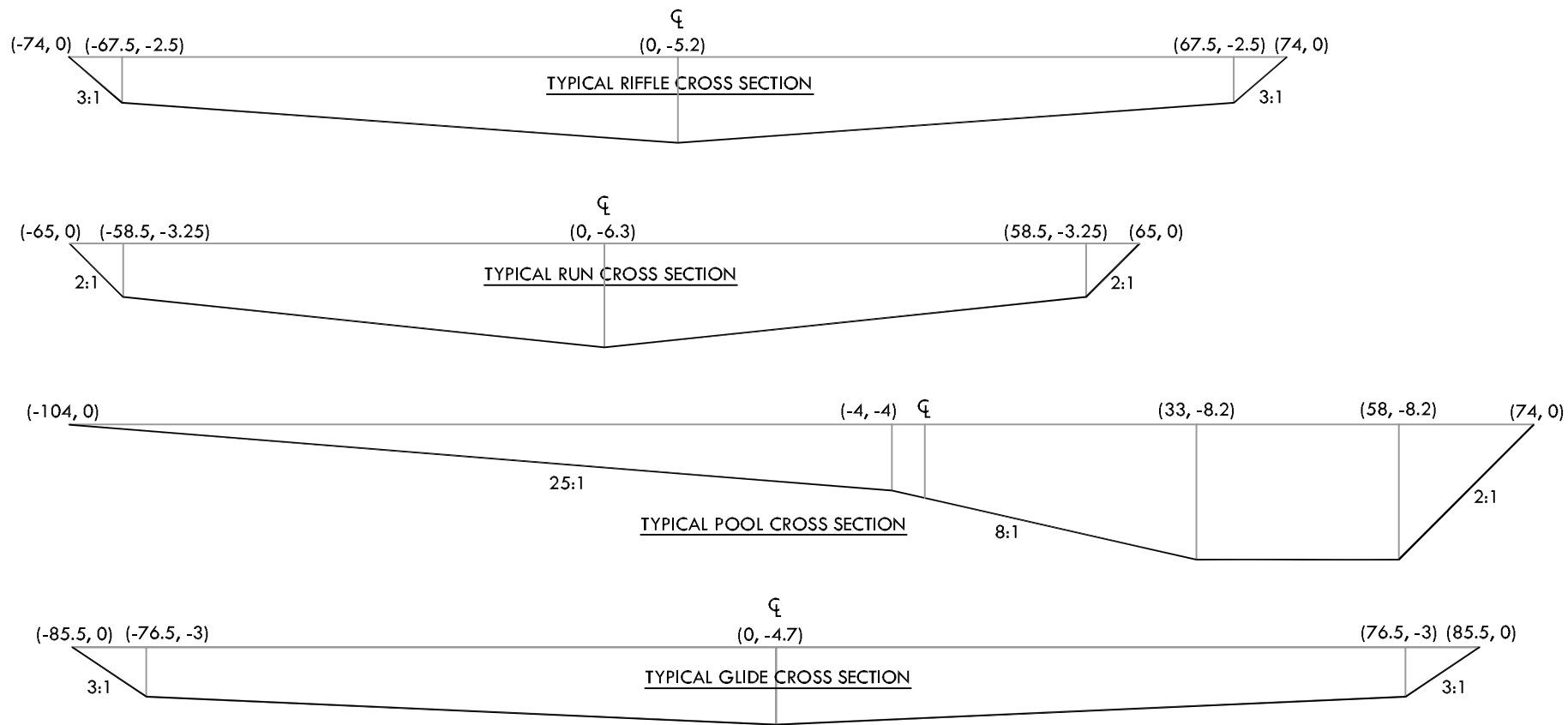


CFR3



BANKFULL CHANNEL DESIGN DIMENSIONS CFR3				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	3200 cfs	3200 cfs	3200 cfs	3200 cfs
WIDTH	163-193 ft	141-156 ft	120-142 ft	162-179 ft
MEAN DEPTH	2.9-3.4 ft	3.5-3.9 ft	4.1-4.8 ft	3.5-3.9 ft
MAX. DEPTH	7.4-11.1 ft	4.7-5.7 ft	5.9-6.7 ft	4.2-5.1 ft
SCOUR DEPTH	13 ft	5.9 ft	7.4 ft	5.3 ft
XS AREA	688 sq ft	550 sq ft	578 sq ft	605 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	42-51

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal

2001020

SCALE: 1" = 20' H  
SCALE: 1" = 10' V

2	10-15-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

DRAWN BY: NMW

DESIGNED BY: GTD/MSD

CHECKED BY: MSD


PROJECT NO.: RDG-04-018

SHEET K-1

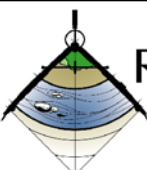
FILE NAME: RDG-11X17.dwg

WestWater Consultants, Inc.  
1112 Catherine Lane  
Corvallis, MT 59828  
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River Design Group, Inc.  
P.O. Box 1722  
Whitefish, MT 59937  
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www.riverdesigngroup.net

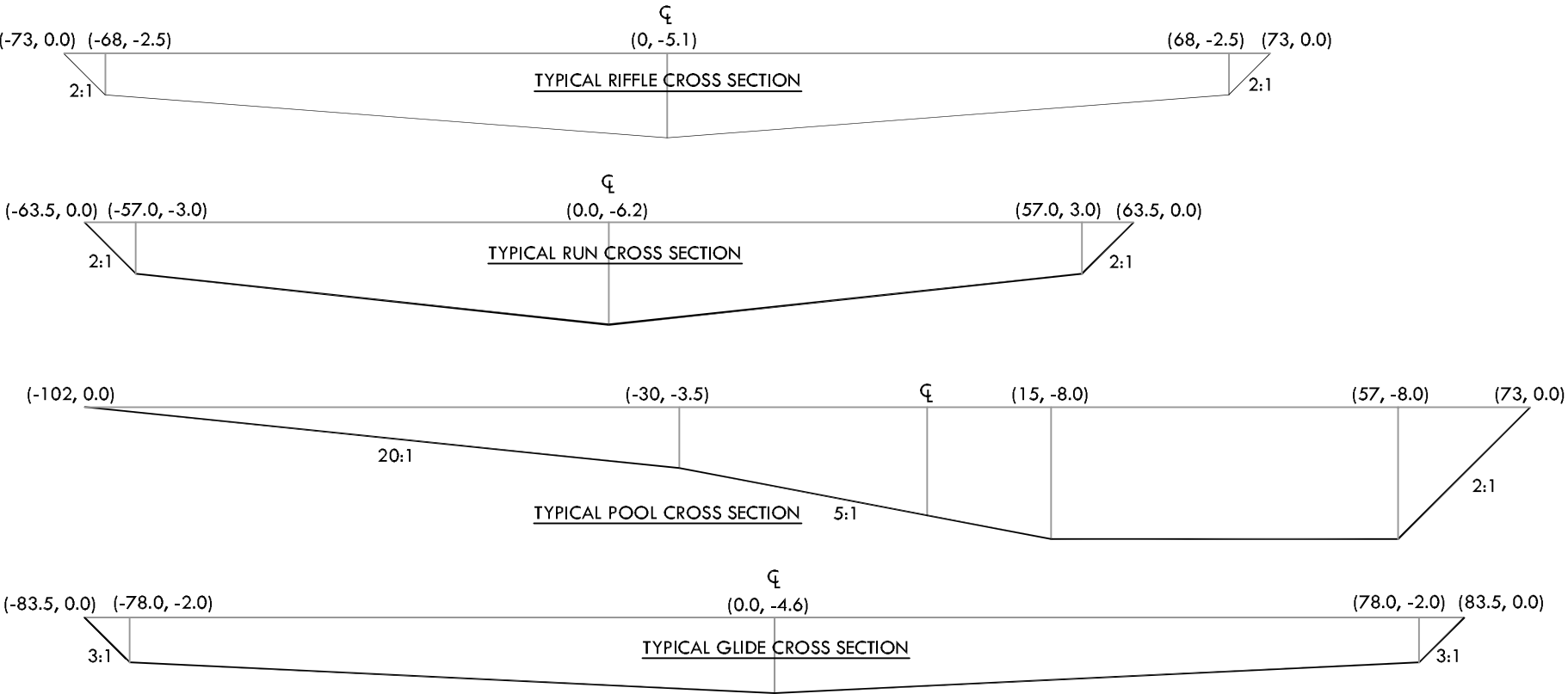


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RIVER DESIGN GROUP, INC.

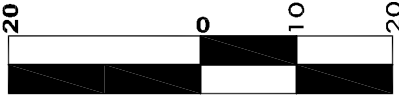
CFR 2



BANKFULL CHANNEL DESIGN DIMENSIONS CFR 2				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	3200 cfs	3200 cfs	3200 cfs	3200 cfs
WIDTH	160-189 ft	138-153 ft	118-139 ft	159-176 ft
MEAN DEPTH	2.8-3.3 ft	3.5-3.8 ft	4.0-4.7 ft	3.5-3.8 ft
MAX. DEPTH	7.3-10.9 ft	4.6-5.6 ft	5.8-6.6 ft	4.1-5.0 ft
SCOUR DEPTH	12.7 ft	5.8 ft	7.3 ft	5.2 ft
XS AREA	795 sq ft	530 sq ft	557 sq ft	583 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	42-50

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal



SCALE: 1" = 20' H  
SCALE: 1" = 10' V

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

WestWater Consultants, Inc.  
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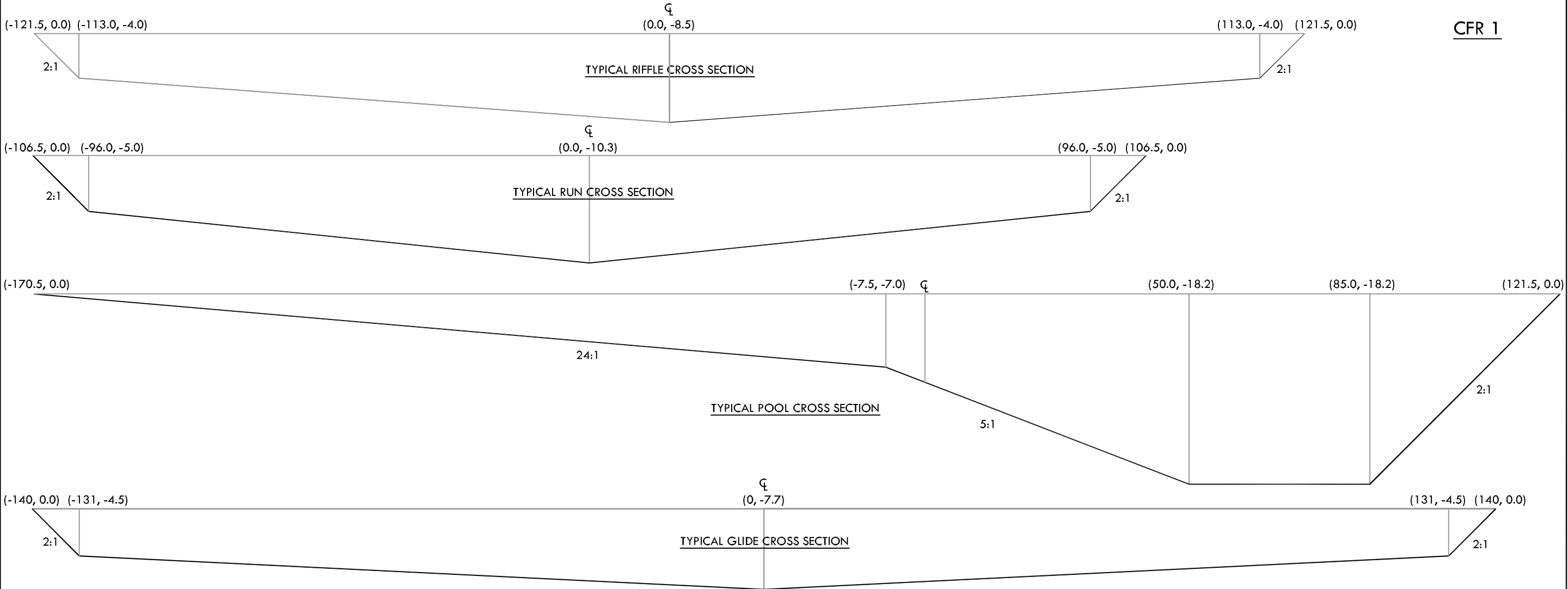
River Design Group, Inc.  
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DRAWN BY: NMW  
DESIGNED BY: GTD/MSD  
CHECKED BY: MSD  
PROJECT NO.: RDG-04-018

SHEET  
K-2  
FILE NAME:  
RDG-11X17.dwg

NO.	DATE	BY	REVISION DESCRIPTION
2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT



CFR 1

BANKFULL CHANNEL DESIGN DIMENSIONS CFR 1				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	10400 cfs	10400 cfs	10400 cfs	10400 cfs
WIDTH	268-316 ft	231-255 ft	197-232 ft	265-293 ft
MEAN DEPTH	4.7-5.5 ft	5.8-6.4 ft	6.7-7.9 ft	5.8-6.4 ft
MAX. DEPTH	12.2-24.3 ft	8.3-8.7 ft	9.7-10.9 ft	7.5-7.8 ft
SCOUR DEPTH	24.3 ft	9.1 ft	12.2 ft	8.2 ft
XS AREA	2220 sq ft	1480 sq ft	1554 sq ft	1628 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	41-51

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal

200

0

10

20

SCALE: 1" = 20' H  
SCALE: 1" = 10' V

2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

DRAWN BY: NMW

DESIGNED BY: GTD/MSD

CHECKED BY: MSD


PROJECT NO.: RDG-04-018

SHEET K-3

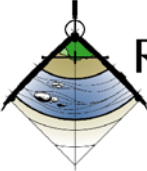
FILE NAME: RDG-11X17.dwg

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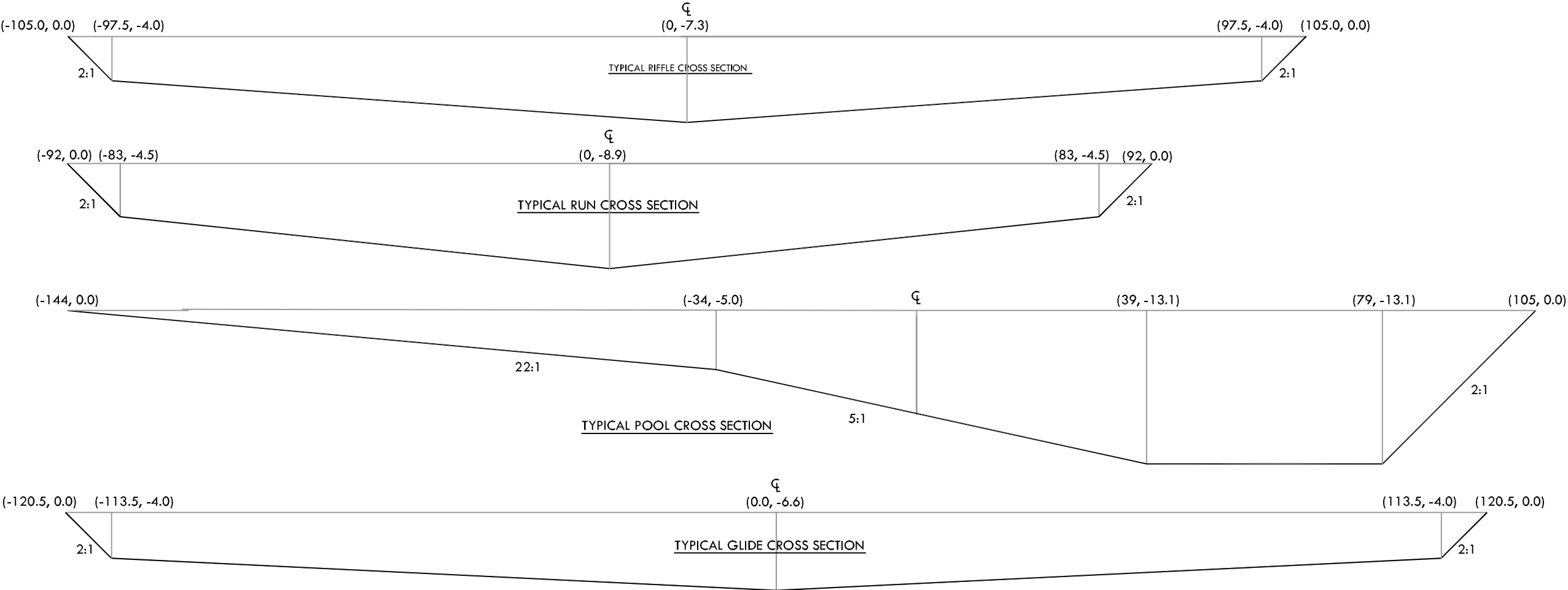


WestWater Consultants, Inc.



RIVER DESIGN GROUP, INC.

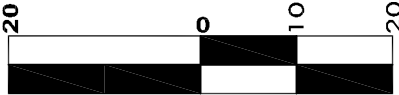
CFR 1 - Right Channel @ Island Below Dam



BANKFULL CHANNEL DESIGN DIMENSIONS CFR 1 Right Channel @ Island Below Dam				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	10400 cfs	10400 cfs	10400 cfs	10400 cfs
WIDTH	231-273 ft	199-220 ft	169-200 ft	229-253 ft
MEAN DEPTH	4.0-4.8 ft	5.0-5.5 ft	5.8-6.8 ft	5.0-5.5 ft
MAX. DEPTH	10.5-15.7 ft	7.2-7.5 ft	8.4-9.4 ft	6.5-6.8 ft
SCOUR DEPTH	18.4 ft	7.9 ft	10.5 ft	7.1 ft
XS AREA	1650 sq ft	1100 sq ft	1155 sq ft	1210 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	42-51

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal



SCALE: 1" = 20' H  
SCALE: 1" = 10' V

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

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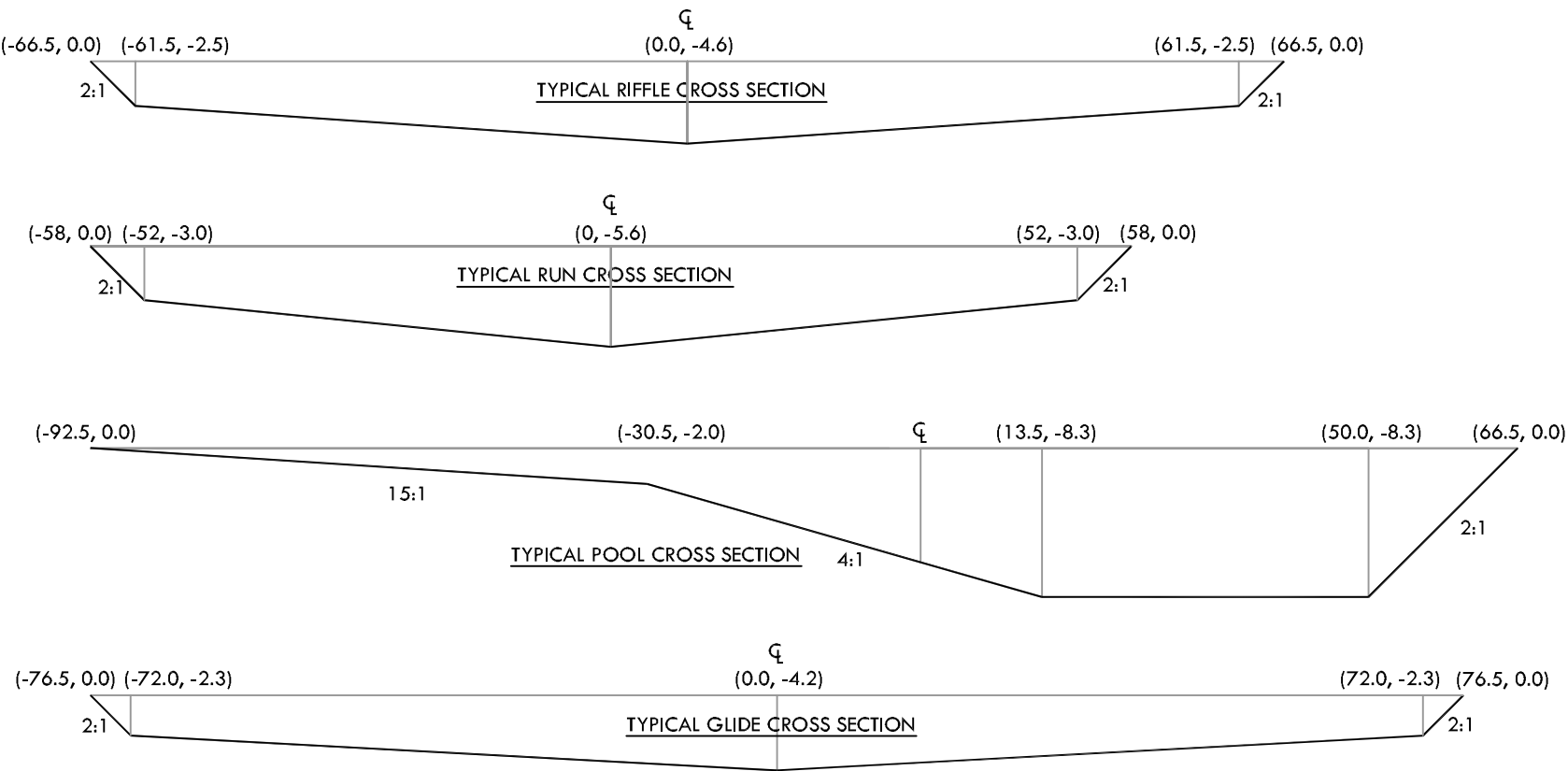


2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

DRAWN BY:	NMW	SHEET K-4	
DESIGNED BY:	GTD/MSD		
CHECKED BY:	MSD		
PROJECT NO.:	RDG-04-018		

FILE NAME:  
RDG-11X17.dwg

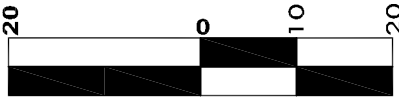
CFR 1 - Left Channel @ Island Below Dam



BANKFULL CHANNEL DESIGN DIMENSIONS CFR 1 - Left Channel @ Island Below Dam				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	10400 cfs	10400 cfs	10400 cfs	10400 cfs
WIDTH	146-172 ft	126-139 ft	107-127 ft	145-160 ft
MEAN DEPTH	2.6-3.0 ft	3.2-3.5 ft	3.6-4.3 ft	3.2-3.5 ft
MAX. DEPTH	6.6-9.9 ft	4.5-4.7 ft	5.3-6.0 ft	4.1-4.3 ft
SCOUR DEPTH	11.6 ft	5.0 ft	6.6 ft	4.5 ft
XS AREA	660 sq ft	440 sq ft	462 sq ft	484 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	41-50

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal



SCALE: 1" = 20' H  
SCALE: 1" = 10' V

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

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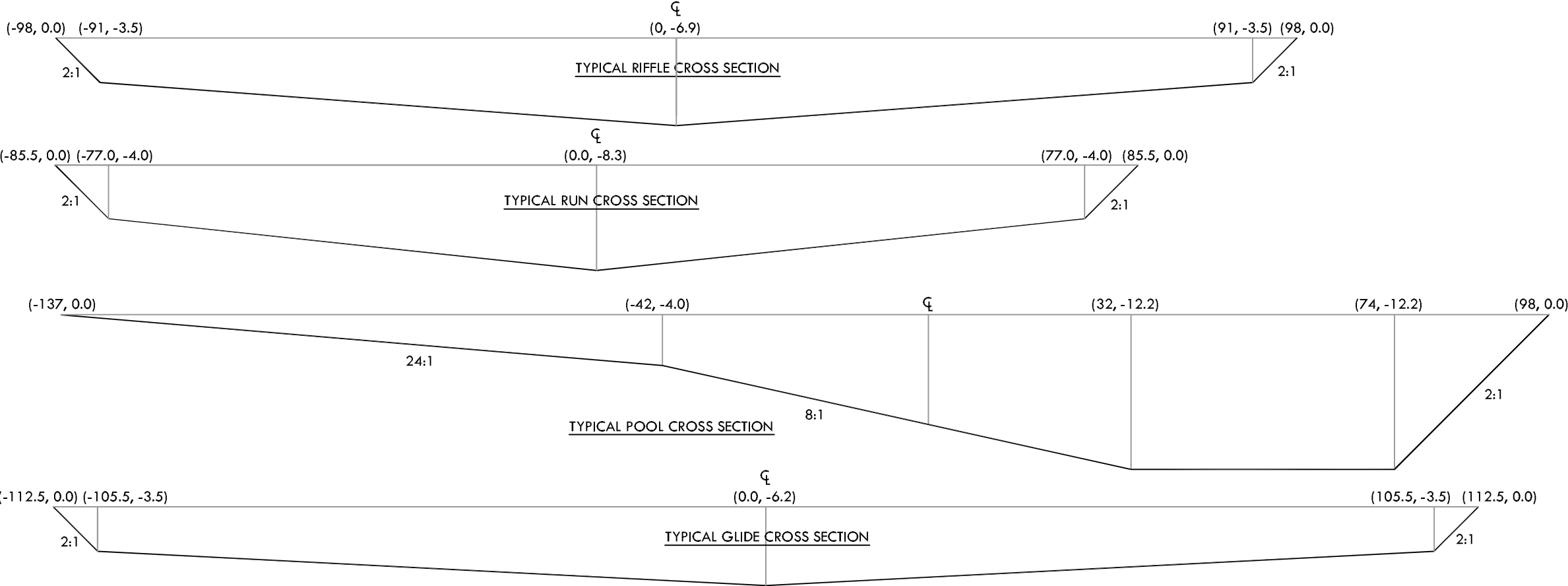
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2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

DRAWN BY:	NMW	SHEET K-5	
DESIGNED BY:	GTD/MSD		
CHECKED BY:	MSD	FILE NAME:	
PROJECT NO.:	RDG-04-018	RDG-11X17.dwg	

BFR 1



BANKFULL CHANNEL DESIGN DIMENSIONS BFR 1				
PARAMETER FEATURE	POOL	RIFFLE	RUN	GLIDE
DISCHARGE	6200 cfs	6200 cfs	6200 cfs	6200 cfs
WIDTH	216-255 ft	186-206 ft	158-187 ft	214-236 ft
MEAN DEPTH	3.8-4.5 ft	4.7-5.2 ft	5.4-6.4 ft	4.7-5.2 ft
MAX. DEPTH	9.8-14.7 ft	6.2-7.5 ft	7.8-8.8 ft	5.6-6.7 ft
SCOUR DEPTH	17.1 ft	7.8 ft	9.8 ft	7.1 ft
XS AREA	1440 sq ft	960 sq ft	1008 sq ft	1056 sq ft
WIDTH:DEPTH	N/A	36-44	25-35	41-50

(x, y)  
x - horizontal distance from channel alignment centerline  
y - vertical difference in elevation from bankfull

Seal



SCALE: 1" = 20' H  
SCALE: 1" = 10' V

TYPICAL CHANNEL CROSS SECTIONS

RESTORATION PLAN

WestWater Consultants, Inc.  
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tel: (406) 961-3348



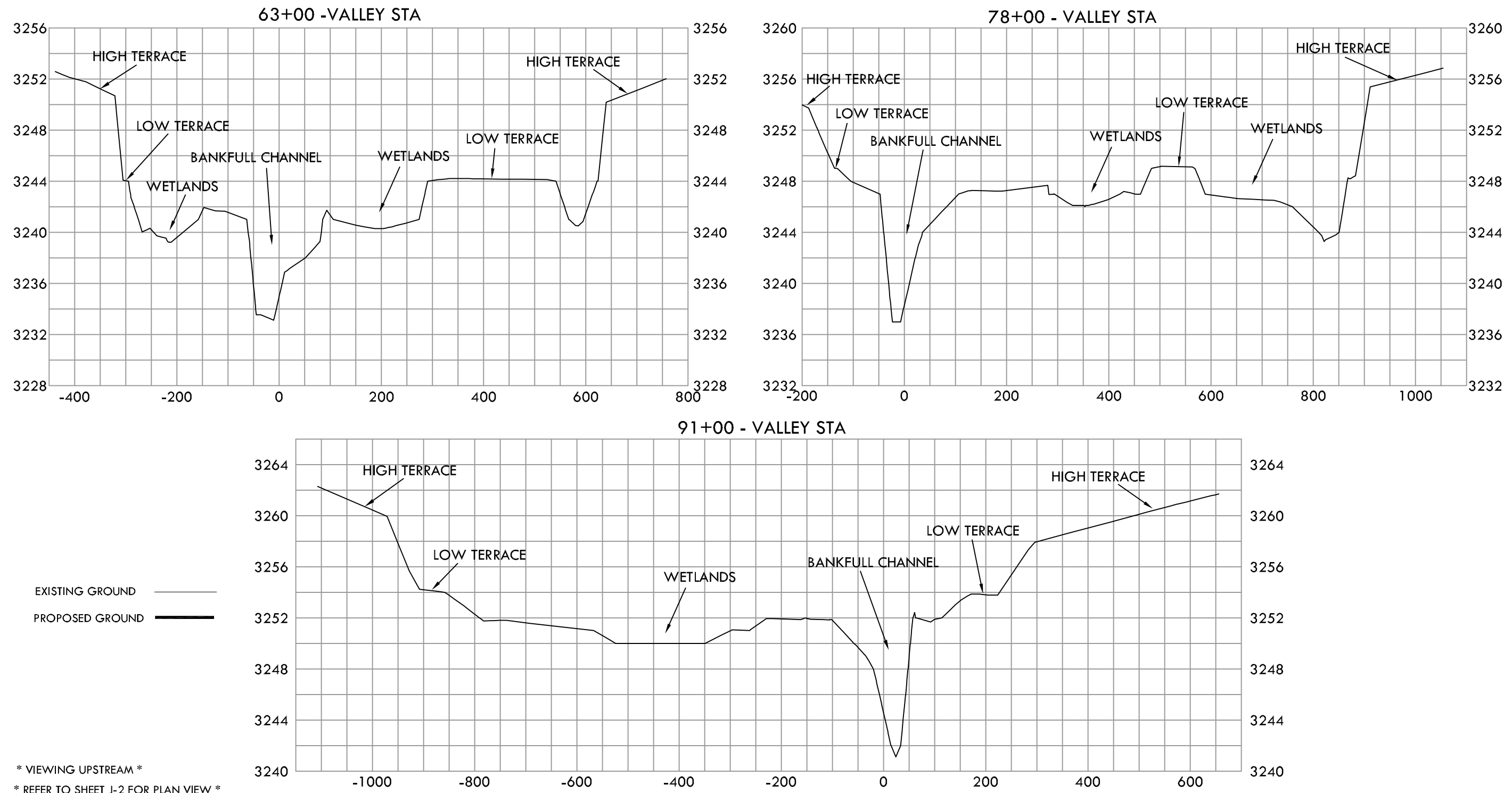
River Design Group, Inc.  
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tel: (406) 862-4927  
fax: (406) 862-4963  
www.riverdesigngroup.net



2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

DRAWN BY:	NMW
DESIGNED BY:	GTD/MSD
CHECKED BY:	MSD
PROJECT NO.:	RDG-04-018

SHEET K-6
FILE NAME: RDG-11X17.dwg



Seal

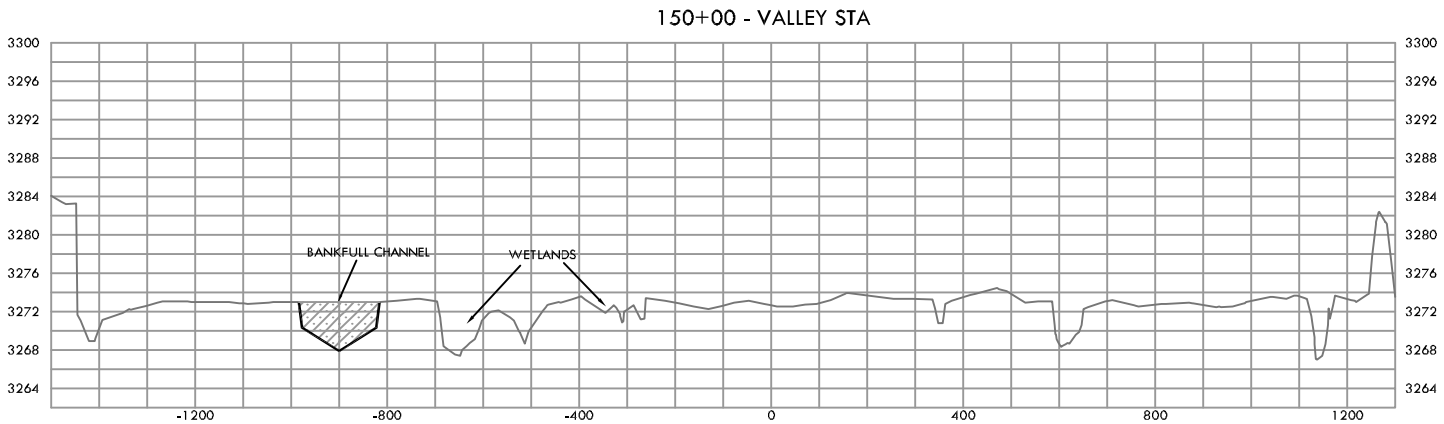
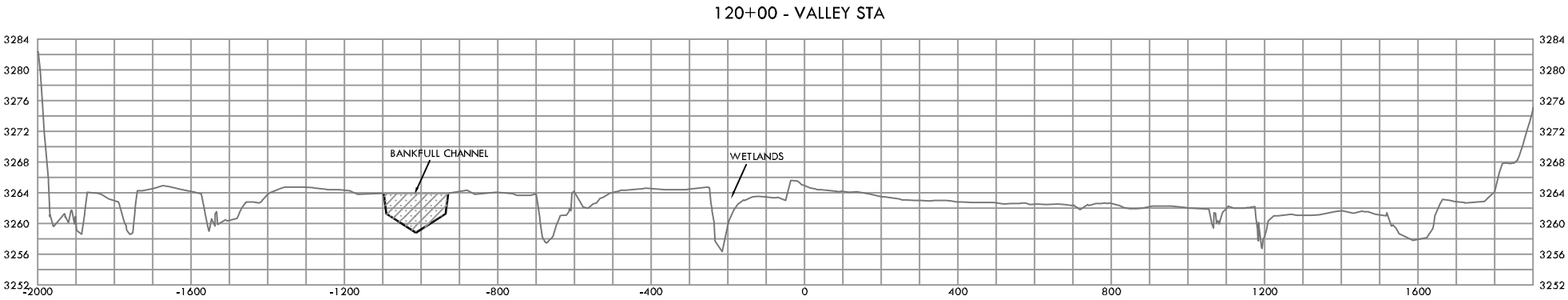
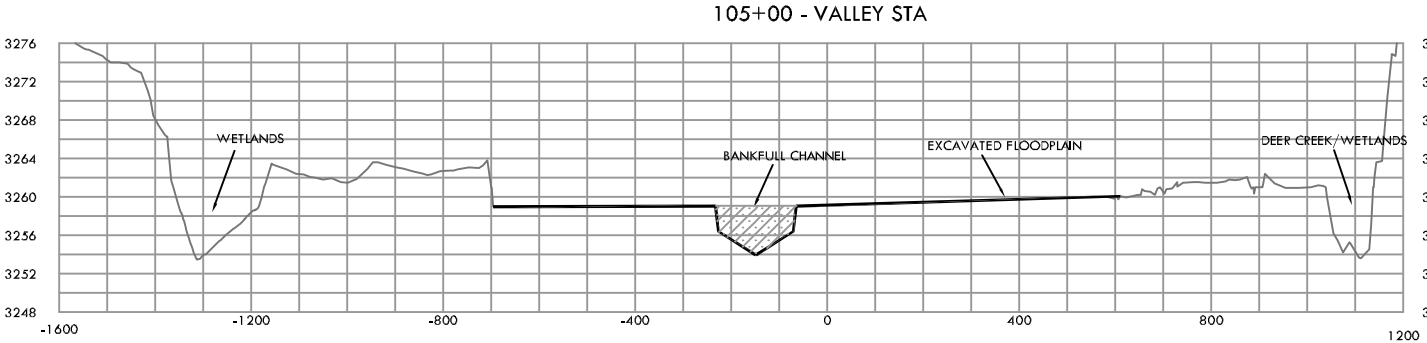
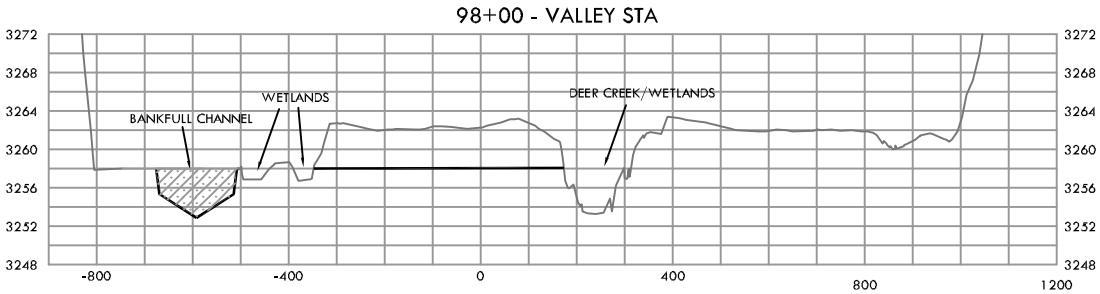
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2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

CFR 2 - VALLEY CROSS SECTIONS			
RESTORATION PLAN			
DRAWN BY:	NMW	SHEET K-7	
DESIGNED BY:	GTD/MSD		
CHECKED BY:	MSD	FILE NAME: RDG-11X17.dwg	
PROJECT NO.:	RDG-04-018		

WestWater Consultants, Inc.  
1112 Catherine Lane  
Corvallis, MT 59828  
tel: (406) 961-3348

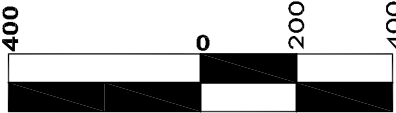
River Design Group, Inc.  
P.O. Box 1722  
Whitefish, MT 59937  
tel: (406) 862-4927  
fax: (406) 862-4963  
www.riverdesigngroup.net





EXISTING GROUND ———  
PROPOSED GROUND ———

\* VIEWING UPSTREAM \*  
\* REFER TO SHEET J-2 & J-3 FOR PLAN VIEW \*



SCALE: 1" = 400' H  
SCALE: 1" = 20' V

CFR 3 - VALLEY CROSS SECTIONS

RESTORATION PLAN

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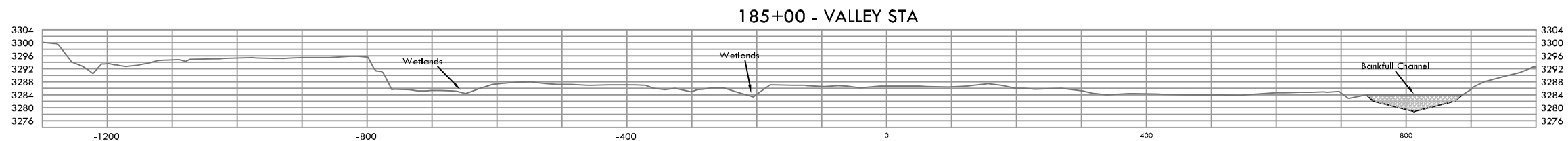
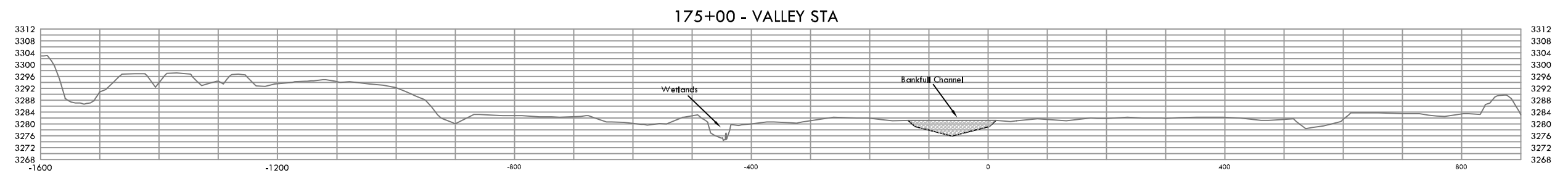
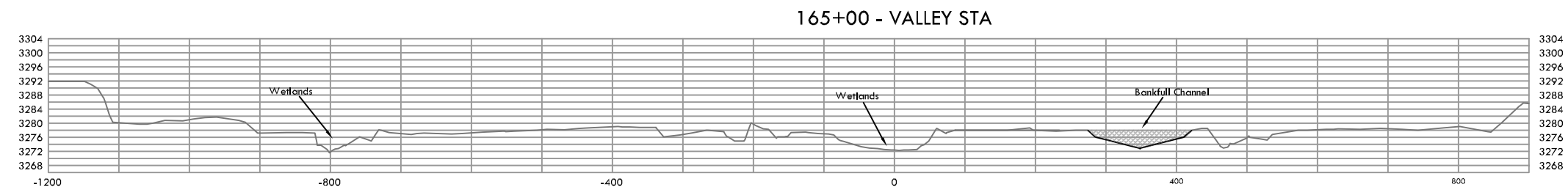


DRAWN BY: NMW  
DESIGNED BY: GTD/MSD  
CHECKED BY: MSD  
PROJECT NO.: RDG-04-018

SHEET  
K-8  
FILE NAME:  
RDG-11X17.dwg

NO.	DATE	BY	REVISION DESCRIPTION
2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT

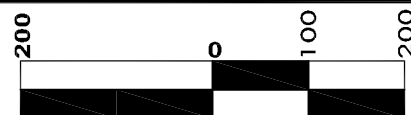




EXISTING GROUND \_\_\_\_\_  
PROPOSED GROUND \_\_\_\_\_

\* VIEWING UPSTREAM \*  
\* REFER TO SHEET J-3 FOR PLAN VIEW \*

Seal

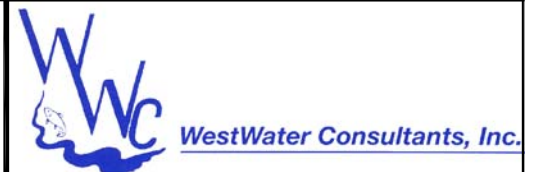


SCALE: 1" = 200' H  
SCALE: 1" = 40' V

### CFR 3 - VALLEY CROSS SECTIONS

### RESTORATION PLAN

WestWater Consultants, Inc.  
1112 Catherine Lane  
Corvallis, MT 59828  
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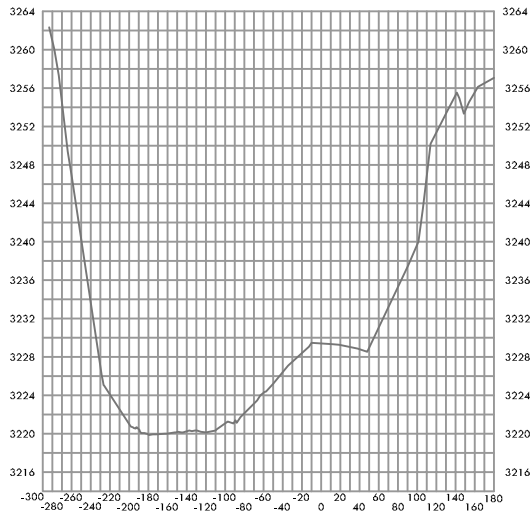
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DESIGNED BY: GTD/MSD  
CHECKED BY: MSD  
PROJECT NO.: RDG-04-018

**SHEET  
K-9**

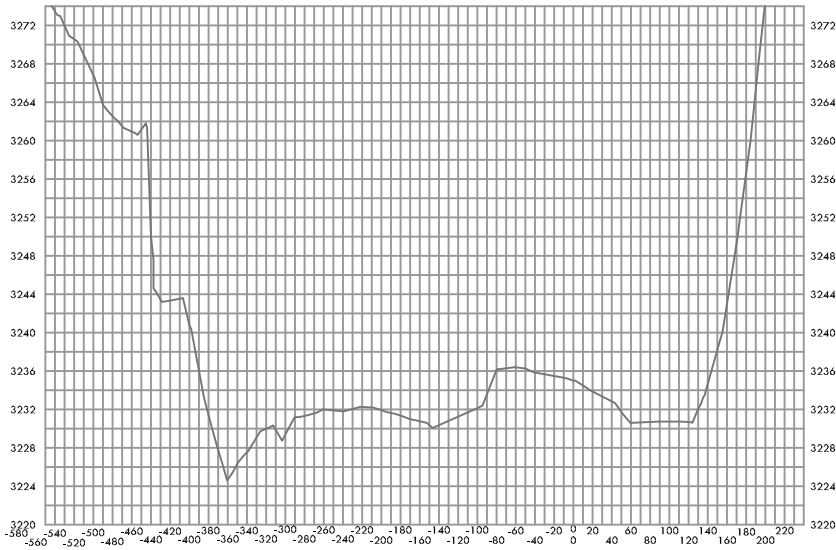
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RDG-11X17.dwg

NO.	DATE	BY	REVISION DESCRIPTION
2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT

27+00 - VALLEY STA



41+00 - VALLEY STA



45+00 - VALLEY STA

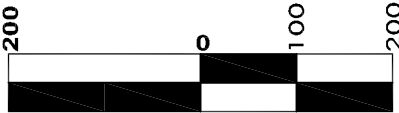


50+00 - VALLEY STA



EXISTING GROUND  
PROPOSED GROUND

\* VIEWING UPSTREAM \*  
\* REFER TO SHEET J-1 FOR PLAN VIEW\*



SCALE: 1" = 200' H  
SCALE: 1" = 20' V

CFR 1 - VALLEY CROSS SECTIONS

RESTORATION PLAN

WestWater Consultants, Inc.  
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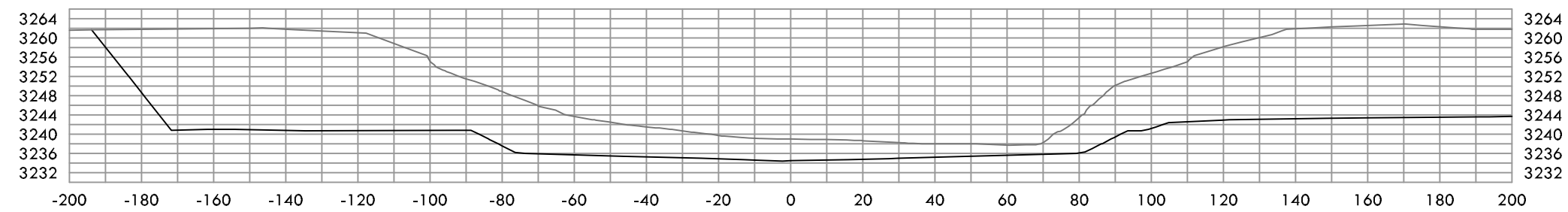
Seal

2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

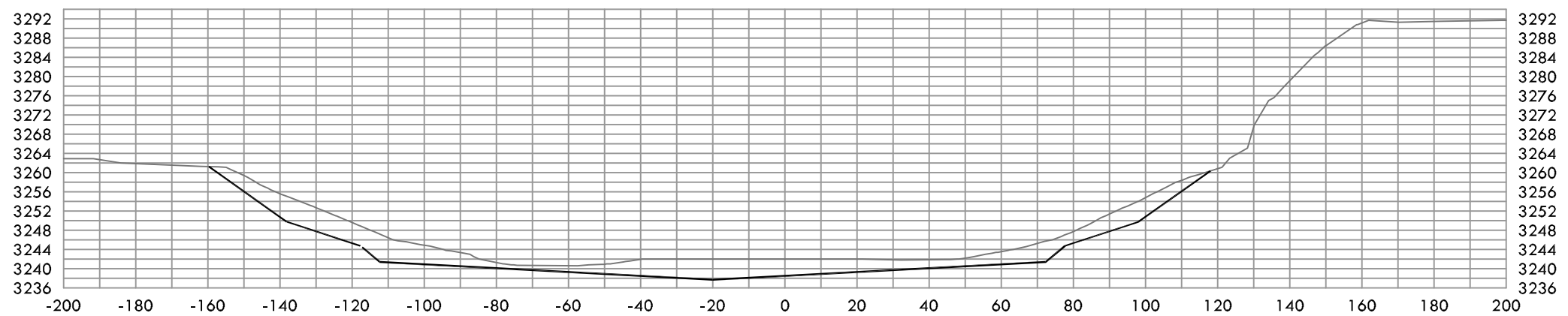
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DESIGNED BY:	GTD/MSD
CHECKED BY:	MSD
PROJECT NO.:	RDG-04-018

SHEET K-10
FILE NAME: RDG-11X17.dwg

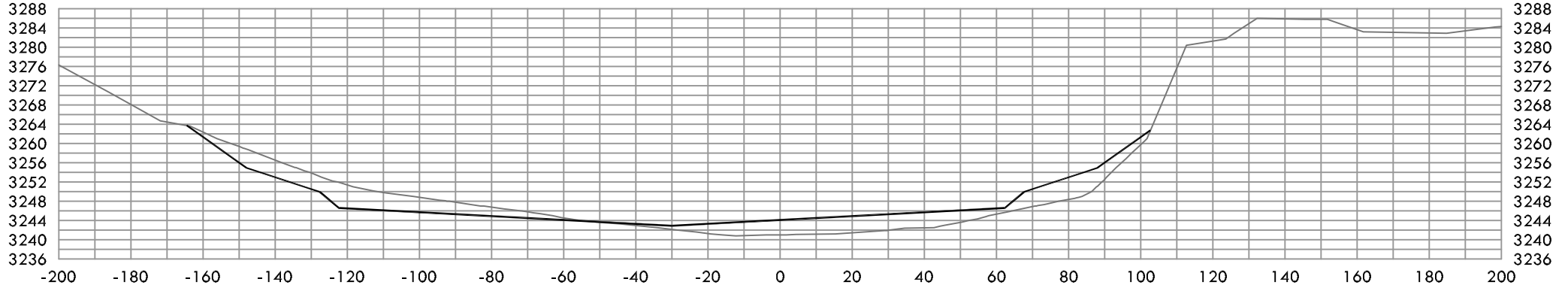
7+00 - BFR STA



20+00 - BFR STA



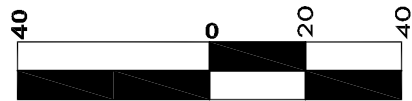
40+00 - BFR STA



EXISTING GROUND  
PROPOSED GROUND

\* VIEWING UPSTREAM \*  
\* REFER TO SHEET I-5 FOR PLAN VIEW \*

Seal



SCALE: 1" = 40' H  
SCALE: 1" = 30' V

BFR 1 - VALLEY CROSS SECTIONS

RESTORATION PLAN

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2	10-14-05	KLC	FINAL
1	03-29-05	MSD	DRAFT
NO.	DATE	BY	REVISION DESCRIPTION

DRAWN BY:	NMW	SHEET K-11	
DESIGNED BY:	GTD/MSD		
CHECKED BY:	MSD	FILE NAME:	
PROJECT NO.:	RDG-04-018	RDG-11X17.dwg	